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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G07C 1/10, 9/00	A1	(11) International Publication Number: **WO 96/30875**
		(43) International Publication Date: 3 October 1996 (03.10.96)

(21) International Application Number: PCT/GB96/00793

(22) International Filing Date: 1 April 1996 (01.04.96)

(30) Priority Data:
9506657.7   31 March 1995 (31.03.95)   GB
9507261.7   7 April 1995 (07.04.95)   GB

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(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).
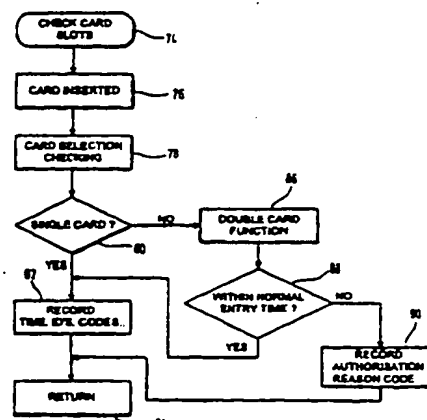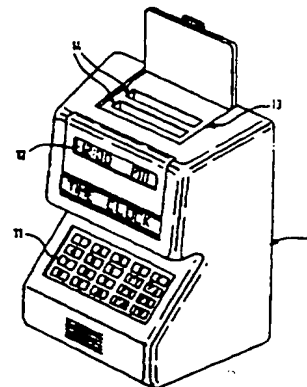
Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: IMPROVEMENTS IN OR RELATING TO THE CONTROL OR MONITORING OF ELECTRICAL EQUIPMENT

(57) Abstract

A time clock apparatus has an IC card reader/writer (13) incorporated therein which has two slots (14) each arranged to receive an IC card. The time clock apparatus (10) incorporates a processor (20), associated memory (24) and a real time clock (22). IC cards (40, 42) carry information identifying persons who use the time clock. Each person requiring access to premises is required to insert their IC card into one slot (14) of the reader/writer (13) whilst a security supervisor's IC card is within the second slot (14). If both cards are validated, the time clock records the time and the identification of the person requiring access. Furthermore, the time clock may be arranged to actuate a door lock or other perimeter guard to enable physical access to the premises.

IMPROVEMENTS IN OR RELATING TO THE CONTROL
OR MONITORING OF ELECTRICAL EQUIPMENT

The present invention relates generally to the control
or monitoring of electrical equipment. In one example, the
invention relates to a method of recording attendance using
a time clock apparatus, and to time clock apparatus.

There is often a need to control or monitor use of
electrical equipment such as, computers, telephones, door
access controls and time clocks. Often this need arises
because it is required to monitor the use thereby by those
who are authorised to use the equipment. Additionally
and/or alternatively, the need may arise to control the use
of the equipment by authorised personnel, for example, by
providing a further level of authorisation.

One particular implementation of the overall control
method is exemplified by the use of attendance time clock
recorders. It may be wished, for example, to require two
persons to use the time clock recorder simultaneously in
order to enable one of those persons access to secure
premises and/or to enable equipment for their use. It may
additionally and/or alternatively be required to ensure
that there is control of people entering or leaving a
restricted area, particularly outside normal hours. It may
also be required to monitor the performance of a security
guard controlling a restricted area.

It is an object of the present invention to provide a
method and apparatus enabling control or monitoring of
electrically actuated equipment, and/or to provide a method
of recording attendance using a time clock apparatus, and a
time clock apparatus.

According to a first aspect of the present invention

there is provided a method of recording attendance using a
time clock apparatus, the time clock apparatus comprising
processor means, memory means, at least one IC card reader,
and a clock, and the method comprising the steps of
5   providing identification data to said processor means to
enable a record to be kept of the identification data and
the time, said identification data being stored on at least
one IC card.

10   The identification data stored on the IC card
preferably includes information as to the identity of a
person. Thus, any person requiring to use the time clock
apparatus is provided with an IC card which carries
information identifying that person. The IC card might
15 also carry additional information, such as any restrictions
on the activities of the person. Use of the time clock
apparatus requires the insertion of at least one IC card.

        In one embodiment, the or each IC card carries an
20 authorisation or access code.

        In an embodiment, the method of recording attendance
further comprises the steps of recording to said memory
means, and/or to at least one IC card, a record of the
25 usage of the time clock apparatus, said record including
the identification data and the time recorded from a series
of IC cards inserted serially into said time clock
apparatus.

30   Preferably, the method further comprises the step of
checking the validity of said identification data.

        In a preferred embodiment, the method further
comprises the step of enabling the control or monitoring of
35 electrically actuated equipment in response to a
determination that said identification data is valid.

According to a further aspect of the present invention there is provided a method of enabling the control or monitoring of electrically actuated equipment using control apparatus, said control apparatus having processor means, memory means, at least one IC card reader, and interface means, the method comprising the steps of providing identification data to said processor means by way of an IC card and a said IC card reader, checking the validity of said identification data, and, in response to a determination that said identification data is valid, enabling the control or monitoring of said equipment by way of said interface means.

Preferably, use of the time clock apparatus and/or control of the electrically actuated equipment is enabled only upon the provision to the apparatus of the identifications of two persons, where one of those two persons has a particular identification. For example, it may be required that a person or member of staff requiring access or use of the time clock apparatus or the electrically actuated equipment has to insert his IC card into the apparatus simultaneously with a second IC card carrying information identifying a supervisor.

Additionally and/or alternatively, the necessity to provide two IC cards may arise only if use of the time clock apparatus or control of the equipment is required outside normal hours.

In a particularly preferred embodiment, the electrically actuated equipment is, or is part of, equipment controlling access to a restricted area.

For example, the time clock apparatus may be enabled to control a door lock or other perimeter equipment. By

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this means, employees will be forced to record their
attendance by inserting the IC card carrying their
identification into the time clock apparatus in order to
gain access to their employment.

5

The present invention extends to a time clock
apparatus used in a method as defined above.

The invention also extends to control apparatus for
10   use in a method as defined above.

According to a further aspect of the present invention
there is provided control apparatus for controlling or
monitoring electrically actuated equipment, said control
15   apparatus comprising processor means, memory means,
interface means arranged to communicate with said
electrically actuated equipment, and a reading device for
reading the data on IC cards, said reading device being in
communication with said processor means.

20

The present invention also extends to time clock
apparatus comprising processor means, memory means, a
clock, and a reading device for reading the data on IC
cards, said reading device being in communication with said
25   processor means.

The IC card, for example, may carry information
identifying a person and/or any other information about
that person, for example the access that the person can
30   have to the electrically actuated equipment or to an area
controlled or guarded thereby. Thus, the processor means
may use information read from the IC card to determine
whether or not to enable a particular task to be performed.

35   It is possible for the reading device to be arranged
as a read only device enabled to read data carried on IC

cards. In a preferred embodiment, the reading device is
arranged not only to read data from IC cards, but also to
write data thereto.

5   In an embodiment, the reading device has a single slot
so that it can receive, and read and/or write, data to only
one IC card at a time. Preferably, however, the reading
device has a number of slots so that a number of IC cards
can be inserted therein and read from, or written to,
10   simultaneously.

          In a preferred embodiment, a second reading device is
provided remote from said first reading device, each of
said first and second reading devices having a single slot
15   so that it can receive, and read and/or write, data to only
one IC card at a time.

          Embodiments of the present invention will hereinafter
be described by way of example, with a reference to the
20   accompanying drawings, in which

          Figure 1 shows a perspective view of time clock
apparatus of the invention having an IC card reader/writer
incorporated therein,
25   Figure 2 shows an alternative embodiment of a time
clock apparatus electrically connected to a separate IC
card reader/writer,
          Figure 3 shows a block circuit diagram of the time
clock apparatus of Figure 1 or of Figure 2,
30   Figure 4 is a flow chart showing set up routines for
time clock apparatus of the invention,
          Figure 5 is a flow chart showing a method of utilising
time clock apparatus as a time attendance recorder, and
          Figure 6 shows an operational flow chart of a time
35   clock apparatus which also controls access to a secured
area.

Figure 1 shows a time clock apparatus which comprises a substantially conventional time clock recorder 10 having a key pad 11. As shown in Figure 3, a processor 20
5 arranged to respond to the operation of the key pad 11, and a real time clock 22, are incorporated within the time clock 10. In normal manner, the processor 20 is provided with internal memory, and an external memory 24, for example, a 32K byte static RAM is also provided. A display
10 12, for example, a dot matrix LCD, is provided for displaying the time and/or the identification number of a person, and/or any further information required. An IC card reader/writer 13 is incorporated within the time clock 10. The reader/writer 13 has two slots 14, each of which
15 contains a respective IC card connector 26, 28 for receiving an IC card for reading information therefrom or writing information thereto. The card connectors 26, 28 of the reader/writer 13 are connected to communicate with the processor 20 provided within the time clock 10.
20

In the embodiment illustrated, the key pad 11 comprises a sixteen key keypad 30 and a four key keypad 32. Both of these keypads 30, 32 communicate with the processor 20. Electrical power is provided to the time clock 10
25 either from the mains or from a battery pack (not shown). In either case a battery back-up, as indicated at 34, is preferably provided. The time clock 10 is also provided with a serial communication link 36 enabling the processor 20 to receive information from outside sources and/or to
30 communicate with peripheral devices.

Figure 2 shows an alternative embodiment of a time clock apparatus 10. As with the apparatus of Figure 1, the apparatus of Figure 2 has an IC card reader/writer 13
35 incorporated therein. However, in the embodiment of Figure 2 only a single slot 14 is provided within the

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reader/writer 13. A first IC card connector 26 is provided
within the slot 14. The embodiment of Figure 2 also has a
second card connector 28 but this is provided in a slot 141
in a remote IC card reader/writer 131. The second IC card
5   connector 28 is connected to the processor 20 of the time
clock 10 by way of a shielded cable 38. As will become
apparent, the provision of the second IC card connector 28
in a remote reader/writer 131 is particularly helpful where
the time clock 10 is additionally to be used to control
10   access to a secure area.

IC cards, as 40 and 42 (Figure 2), to be used with the
time clock apparatus may each carry, for example, the
identification of a respective person who is required use
15   the time clock, and, in this instance, the processor 20 is
programmed to read the necessary information from the IC
cards by way of the IC card connectors 26, 28.
Additionally and/or alternatively, each IC card 40, 42 may
be programmed to carry instructions for the processor 20.
20   The or each reader/writer 13, 131 may be provided with its
own processor 20 in communication with the processor of the
time clock 10.

The apparatus described above and illustrated may be
25   used, for example, to control the movements of staff or
visitors who require to enter or leave premises. In this
case, each person requiring access is provided with an IC
card carrying data identifying that person. Furthermore, a
supervisor, for example a security guard, may also be
30   provided with an IC card carrying identification
information. The security guard's IC card may simply
identify the security guard or may also identify the level
of authorisation of the guard. In one method of
controlling access to premises, both the person requiring
35   access and the security guard have to insert a respective
IC card into the reader/writer 13, 131 substantially at the

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same time. The time clock will ensure that the insertions
are in the same time scale, and may record the
identifications. The information may be recorded to the
memory of the processor 20 and/or to the security guard's
5   IC card.

        Where the time clock is to be used for recording the
access of visitors to premises, it would be possible to
provide each visitor with an IC card. Alternatively,
10   access for a visitor may be allowed by the security guard
by inserting his IC card alone but then inserting, by way
of the key pad 11, or by external means connected by the
serial link 36, the name, company name and/or any other
identification of the visitor. Again, the person to whom
15   access is to be allowed and the time of access is recorded.

        It will be appreciated that a similar process is
preferably undertaken when staff and/or visitors leave the
premises. This means that a complete record can be built
20   up of the time persons spend on the premises, and a record
can also be made of persons who have not apparently left
the premises. These records may be analysed and made
available for use, for example, by recording them onto an
IC card inserted into the reader/writer 13, 131 and then
25   downloading the information into a computer for analysis
and subsequent use.

        It will be appreciated that the routines to be
undertaken by time clock apparatus of the invention may be
30   chosen as required, and in accordance with all the
circumstances. Furthermore, the software to control any
required routine is within the competence of anyone skilled
in the art and, therefore, does not need to be described.
However, to aid in the understanding of the invention, a
35   number of possible routines of the time clock apparatus
will now be described, by way of example only, to

illustrate some, but not all, of the usages of a time clock
of the present invention.

Figure 4 is a flow chart of a routine of a time clock
apparatus as shown in Figure 3 which enables the settings,
and hence the operation of the time clock, to be chosen as
required. The routine of Figure 4 may be a default routine
of the time clock in that it is commenced when power is
applied to the time clock 10, and/or whenever any other
routine comes to a termination. In this respect, and as is
clear from Figure 4, the first function of the routine, at
50, is an initialisation function in which all the program
settings are appropriately initialised in known manner.

The set up routine of Figure 4 commences upon the
entry by a user of a password which is checked against a
stored password as indicated at function box 52. At a
decision box 54 the result of the comparison determines the
next step. If the password is incorrect, the routine does
not continue but requires the password to be re-entered. Of
course, and as is well known, the password checking routine
can be arranged to shut down the time clock apparatus or
otherwise prevent access to the rest of the set up routine
if an erroneous password is entered more than three times,
for example. Furthermore, whilst it is presently envisaged
that the password will be entered by way of the keypads
30/32, it would be possible for it to be entered from
external means, for example, by way of the serial link 36
and/or by way of an IC card inserted into one of the IC
card connectors 26, 28.

If the password is correct, the routine moves on to
the function block 56 which displays the date and time in
the display 12. At the next decision box 58, the key pads
30, 32 are inspected to identify if any keys have been
pressed. Where it is detected that a key has been pressed

the routine moves on to a first decision box 60 to
determine if it is a set up key which has been pressed. If
the set up key has been pressed the routine moves on to
function 64. If the set up key 60 has not been pressed,
5   the routine moves on to decision box 62 to determine if a
function key has been pressed, with pressing of the
function key moving the routine to function box 66. If
neither the set up key or the function key has been pressed
the routine cycles to function box 56 to display again the
10   time and date. When it reaches decision box 58, the fact
that no keys have been pressed causes the routine to cycle
through the function box 58 whereby the correct date and
time are continuously displayed. Of course, the set up
routine can be commenced again by pressing the set up key
15   or the function key. Furthermore, the routine may be
expanded to review the state of keys other than the set up
and function keys if required.

As described above, if the set up key has been
20   pressed, the routine moves to the function box 64 which
provides a set up menu. This will take the user through a
number of options which can be accepted or changed as
required. In this respect, the options available will
appear in turn in the display 12 and the user will accept
25   or change them by way of the key pads 30, 32. The options
available may be chosen as required. By way of example
only, one or more of the following options may be provided
in the set up menu:

30   The time settings; namely the year, day, hour, minute.

            The mode of operation; for example, single card or
            double card mode.

35   The language of the display; for example, English or
            Chinese.

The details of communication with external devices and
peripherals; for example, the bit rates used, and the
nature of the link.

5

The first item appearing on the set up menu is
displayed to the user, and after that item has been
accepted or changed the user is asked at the decision box
68 if further changes are required. If further changes are
10 required the routine cycles back to the function box 64 and
the next item of the set up menu is displayed for
acceptance or change. This procedure will display each
item on the set up menu in sequence for acceptance or
change until the user signals that no further changes are
15 required. Once the user signals at decision box 68 that
the operation has been completed the routine cycles back to
function box 56 so that the date and time is displayed
again. Then, by way of the decision box 58, the key pads
are again inspected for depression of the same or other
20 keys.

If the decision box 62 determines that the function
key has been depressed, the routine moves on to the
function box 66 which provides a function menu with items
25 which can be changed or accepted. Again, the options and
choices in the function menu can be chosen as required. By
way of example only these may comprise:

Set the information to be recorded by the time clock.

30

Record identification numbers for the time clock and
for any remote reader/writer as 131.

Set time periods during which access is strictly
35 controlled or not authorised.

Access the information previously recorded by the time
clock.

As described above with reference to the set up menu,
5   the function menu sequentially presents items to be
accepted or changed, and the user is requested at decision
box 70 to indicate if the actions are complete. Once the
user has accepted or changed all the required items on the
function menu, the routine returns to the function block 56
10   to cause the display 12 to display the time and date.

It will be appreciated that other keys may give access
to other control menus in the same manner as illustrated in
respect of decision boxes 60 and 62. When all of the
15   required menus have been dealt with, the routine cycles as
described above to display the date and time. Normal
operation of the device, in response to the pressing of a
key, or the insertion of an IC card, interrupts the
routine.
20

In this respect, and as shown in Figure 5, the
processor 20 periodically checks to see if any IC cards
have been inserted into the card slot associated with
either of the IC card connectors 26 or 28, as indicated at
25   74. Thus, the routine identifies if an IC card is in
either of the slots 14 of the time clock of Figure 1 or in
either of the slots 14 and 141 of the time clock of Figure
2. If the insertion of a card is detected at function
block 74 the routine shown in Figure 5 is commenced. This
30   routine is one possible routine only which may be performed
by the time clock 10 and in this routine attendance
information is recorded as is conventional with time
clocks. At function block 76, therefore, it is checked
that an IC card is inserted within a slot and that a
35   readable connection has been made thereto. If the card can
be read the routine moves on to function box 78 at which it

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is determined whether the apparatus has been set up to be
in single card or double card mode. At decision box 80 the
mode which has been chosen is determined. If it is single
card mode, the routine moves on to function box 82 at which
5   the appropriate information is taken from the inserted IC
card and recorded. For example, the time clock will
record, to its memory and/or to the inserted IC card, the
time as set by the real time clock 22. The identification
of the staff member concerned may also be recorded to the
10   memory of the time clock. When the information gathering
and recording has been completed, the routine ends at
function box 84 which readies the processor to react to the
insertion of further cards, for example.

15   If at decision block 80 it is determined that the time
clock is set to the double card function, the routine moves
to function block 86 which controls that function. In the
embodiment illustrated by Figure 5 the double card function
is provided simply to control entry into, or departure
20   from, the premises outside normal times. Thus, the routine
moves to decision block 88 which determines whether or not
the time of the real time clock is within preset normal
entry times. If the time is within the preset times, the
routine moves to function block 82 at which required
25   information is recorded as described above.

         However, if the time is outside the normal limits,
function box 90 requires further actions to be taken. It
may be, for example, that a security guard is required to
30   enter an authorisation code by way of the key pads and/or
to enter an IC card in the second reader/writer 13, 131
before the routine can move on. At function block 90, time
and ID information and any other information recorded by
way of function box 82 is recorded, but in addition the

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security information entered is also recorded. For
example, the identity of the supervisor providing the
authorisation code and/or his IC card may be recorded. The
routine then moves to the end function block 84 which
5   resets the processor so that it is able to appropriately
react to other prompts.

The time clock, when controlled to operate as set out
in Figure 5, can act as a substantially conventional time
10   clock in that it is controlled to record for each
individual the time of entry or exit. In addition, and as
described above, additional authorisation can be required
by way of the double card function if it is required only
to control access outside normal hours. Such a function is
15   useful, for example, if it is required to allow employees
to leave a company's premises during normal working hours
if they have permission.

Figure 6 shows an example of a routine which may be
20   optionally provided in a time clock of the invention which
gives a much greater level of security and which controls
physical access to the premises. In this respect, whilst
the routine of Figure 6 can be used with the time clock
illustrated in Figure 1, it may be preferred to utilise the
25   time clock shown in Figure 2 because of the remote nature
of the reader/writer 131 in the latter embodiment. Thus,
where access to premises is to be provided through a
doorway, for example, the time clock 10 may be mounted
inside of the doorway with the reader/writer 131 provided
30   externally thereof.

The routine illustrated in Figure 6 commences at
function block 100 with the insertion into the
reader/writer 13 of a security authorisation card. In the
35   routine of Figure 6 the insertion of such a security
authorisation card is essential to enable the routine.

Such a security authorisation card would be an IC card
carried by a security officer or other authorised person
and would preferably carry information identifying the
authorised person. The authorised person would be within
5   the premises, and his security authorisation card is
inserted into the reader/writer 13 incorporated in the time
clock 10 which is also within the premises.

At function block 102 the security authorisation card
10   is checked for validity. For example, it could be required
that such cards carry an expiry date. Additionally and/or
alternatively the card may carry an authorisation code
which is to be checked against stored allowable codes. If
required, it could be an additional requirement that the
15   authorised person has to key in a separate password or
code. At decision block 104 it is determined whether or
not the inserted security card meets the requirements. If
it does not, a function block 106 causes an error message
to be displayed in the display 12 and/or an alarm to be set
20   off. Furthermore, the routine is terminated.

If the decision block 104 authenticates the security
authorisation card, the routine moves to function block 108
at which someone requiring access to the premises, for
25   example, is invited to insert an access IC card into the
remote reader/writer 131 or into the other slot 14 of the
reader/writer 13. The access card may carry information
identifying the employee or simply identify the person as a
visitor. The access card, as 42, may also carry
30   information identifying the level of authorisation
associated with the person identified by the card. That
level of the authorisation is determined at function block
110.

35   In the embodiment illustrated, it is envisaged that
the IC card 42 will have one of two authorisation types,

the type being signalled by an appropriate code on the card
42. These authorisation types are that pre-authorisation
is required or that pre-authorisation is not required.
Where a decision block 112 determines that the access IC
5   card 42 is of the type which does not require pre-
authorisation, the routine moves to function block 114
where a check is made of the current time. If decision
block 116 determines that access is required within normal
entry time, the routine moves to function block 118 at
10 which information as to the access is recorded. Thus, the
time clock may store in memory, the time, the authorisation
code on the security card, and selected information from
the access card 42. For a visitor the information from the
card may simply be an identity number of the card itself.
15 For an employee, the IC card will identify that employee
directly.

        If access is required outside normal entry hours it
may be required to provide additional authorisation. In
20 the routine of Figure 6, the decision block 116 moves the
routine to function block 120 where the security officer or
other authorised person is prompted to enter a further
authorisation code and/or a code identifying the reason why
access is required out of hours. If the entries at
25 function block 120 are satisfactory the routine moves to
function block 122 where appropriate information is stored.
Generally, the information stored at function block 122
will be the same as that required at function block 118.

30   If, at decision block 112, pre-authorisation was
required, the routine would have moved to function block
124 instead of to block 114 as described above. At block
124, the inserted access card 42 is checked for validity,
for example, to determine if it carries a valid access code
35 and/or has not exceeded an expiry date. If a decision
block 126 identifies the access card as invalid, function

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block 128 causes an error message to be displayed on
display 12 and/or an audible alarm to be sounded and the
access routine is terminated.

5   If the decision block 126 confirms that the access
card is valid, the routine then moves through function
blocks 120 and 122 to prompt the input of additional
authorisation and to record the information required as
described above.
10

Once the time clock has recorded the information about
required, the routine, at function block 130, is be
arranged to activate, by way of the serial link 36, an
access gate, a security lock, or other physical gating
15   means.   Thereafter at function blocks 130, 132 the routine
ejects the access card from the reader/writer 13, 131 to
enable the employee or visitor to retrieve the card prior
to entering the premises.

20   The invention has been described with reference to the
illustrated embodiments and with reference to three
possible software routines.   However, it will be
appreciated that additional and/or alternative routines may
be provided in dependence upon the circumstances and, in
25   particular, upon the degree of security required.   Other
variations and modifications to the embodiments as
described and illustrated may be made within the scope of
the appended claims.

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CLAIMS

1.   A method of recording attendance using a time clock
apparatus, the time clock apparatus comprising processor
means, memory means, at least one IC card reader, and a
clock, and the method comprising the steps of providing
identification data to said processor means to enable a
record to be kept of the identification data and the time,
said identification data being stored on at least one IC
card.

2.   A method of recording attendance as claimed in Claim
1, wherein the identification data stored on the IC card
includes information as to the identity of a person.

3.   A method of recording attendance as claimed in Claim 1
or Claim 2, wherein the or each IC card carries an
authorisation or access code.

4.   A method of recording attendance as claimed in any
preceding claim, further comprising the steps of recording
to said memory means, and/or to at least one IC card, a
record of the usage of the time clock apparatus, said
record including the identification data and the time
recorded from a series of IC cards inserted serially into
said time clock apparatus.

5.   A method as claimed in any preceding claim, further
comprising the step of checking the validity of said
identification data.

6.   A method as claimed in Claim 5, further comprising the
step of enabling the control or monitoring of electrically
actuated equipment in response to a determination that said
identification data is valid.

7.   A method of enabling the control or monitoring of
electrically actuated equipment using control apparatus,
said control apparatus having processor means, memory
means, at least one IC card reader, and interface means,
5   the method comprising the steps of providing identification
data to said processor means by way of an IC card and a
said IC card reader, checking the validity of said
identification data, and, in response to a determination
that said identification data is valid, enabling the
10   control or monitoring of said equipment by way of said
interface means.

8.   A method as claimed in Claim 6 or Claim 7, wherein the
step of checking the validity of said identification data
15   comprises the steps of checking identification data on each
of at least two IC cards, the control or monitoring of said
electrically actuated equipment being enabled only in
response to a determination that the identification data on
each of said two IC cards is valid.
20

9.   A method as claimed in any of Claims 6 to 8, further
comprising the step of checking the real time is within a
preset period.

25   10.   A method as claimed in any of Claims 6 to 9, wherein
said electrically actuated equipment is, or is a part of,
equipment controlling access to a restricted area.

11.   A method as claimed in any of Claims 5 to 10, further
30   comprising the step of giving an alarm in a response to a
determination that said identification data is invalid.

12.   A time clock apparatus arranged to perform a method as
claimed in any of Claims 1 to 11.
35

13.   Control apparatus for controlling or monitoring

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electrically actuated equipment by a method as claimed in any of Claims 7 to 11.

14. Control apparatus for controlling or monitoring
5   electrically actuated equipment, said control apparatus comprising processor means, memory means, interface means arranged to communicate with said electrically actuated equipment, and a reading device for reading the data on IC cards, said reading device being in communication with said
10   processor means.

15. Control apparatus as claimed in Claim 14, further comprising a clock, and being arranged to operate as time clock apparatus.
15

16. Time clock apparatus comprising processor means, memory means, a clock, and a reading device for reading the data on IC cards, said reading device being in communication with said processor means.
20

17. Time clock apparatus as claimed in Claim 16, further comprising interface means arranged to communicate with electrically actuated equipment to enable the control or monitoring of said electrically actuated equipment.
25

18. Apparatus as claimed in any of Claims 14 to 17, wherein said reading device is arranged not only to read data from IC cards, but also to write data thereto.

30   19. Apparatus as claimed in any of Claims 14 to 18, further comprising a second IC card reading device arranged to read and/or write data to IC cards.

20. Apparatus as claimed in Claim 19, wherein said first
35   and second IC reading devices are remote from one another.

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21. Apparatus as claimed in any of Claims 14 to 20,
further comprising user interface means.

22. Apparatus as claimed in Claim 21, wherein said user
5   interface means is a keypad.

23. A method of recording attendance using a time clock
apparatus substantially as hereinbefore described with
reference to the accompanying drawings.
10

24. A method of enabling the control or monitoring of
electrically actuated equipment substantially as
hereinbefore described with reference to the accompanying
drawings.
15

25. Time clock apparatus substantially as hereinbefore
described with reference to the accompanying drawings.

26. Control apparatus for controlling or monitoring
20   electrically actuated equipment substantially as
hereinbefore described with reference to the accompanying
drawings.

1 / 7
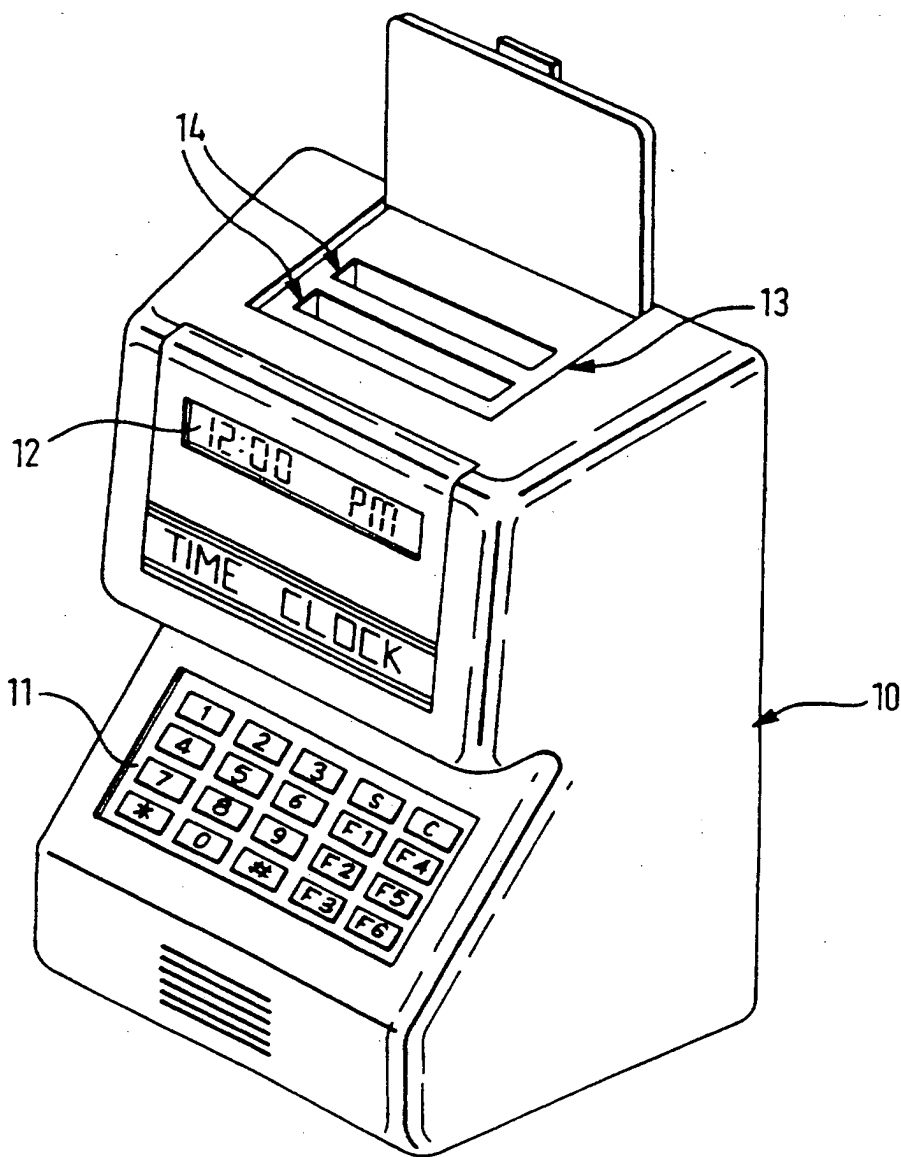
FIG. 1
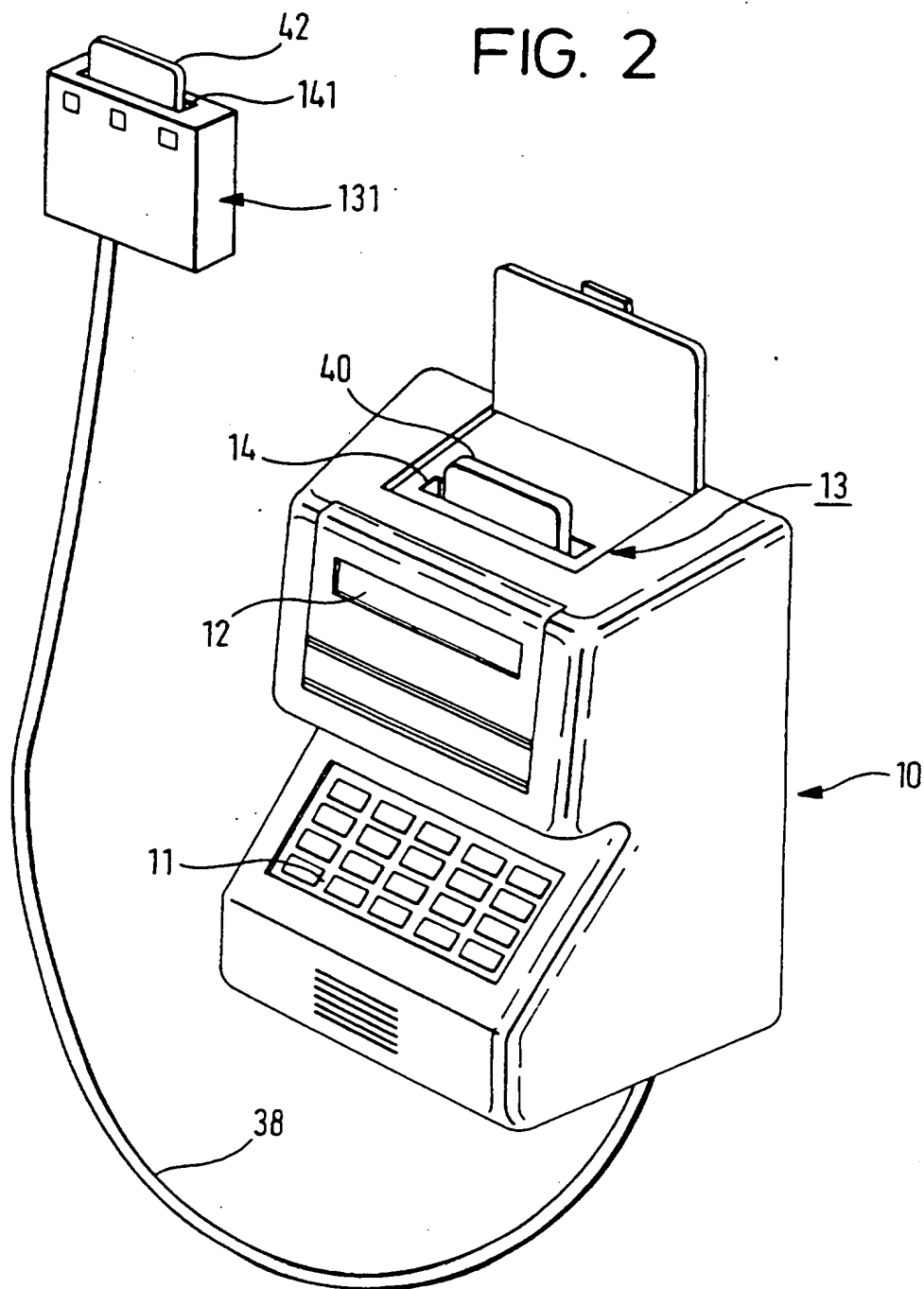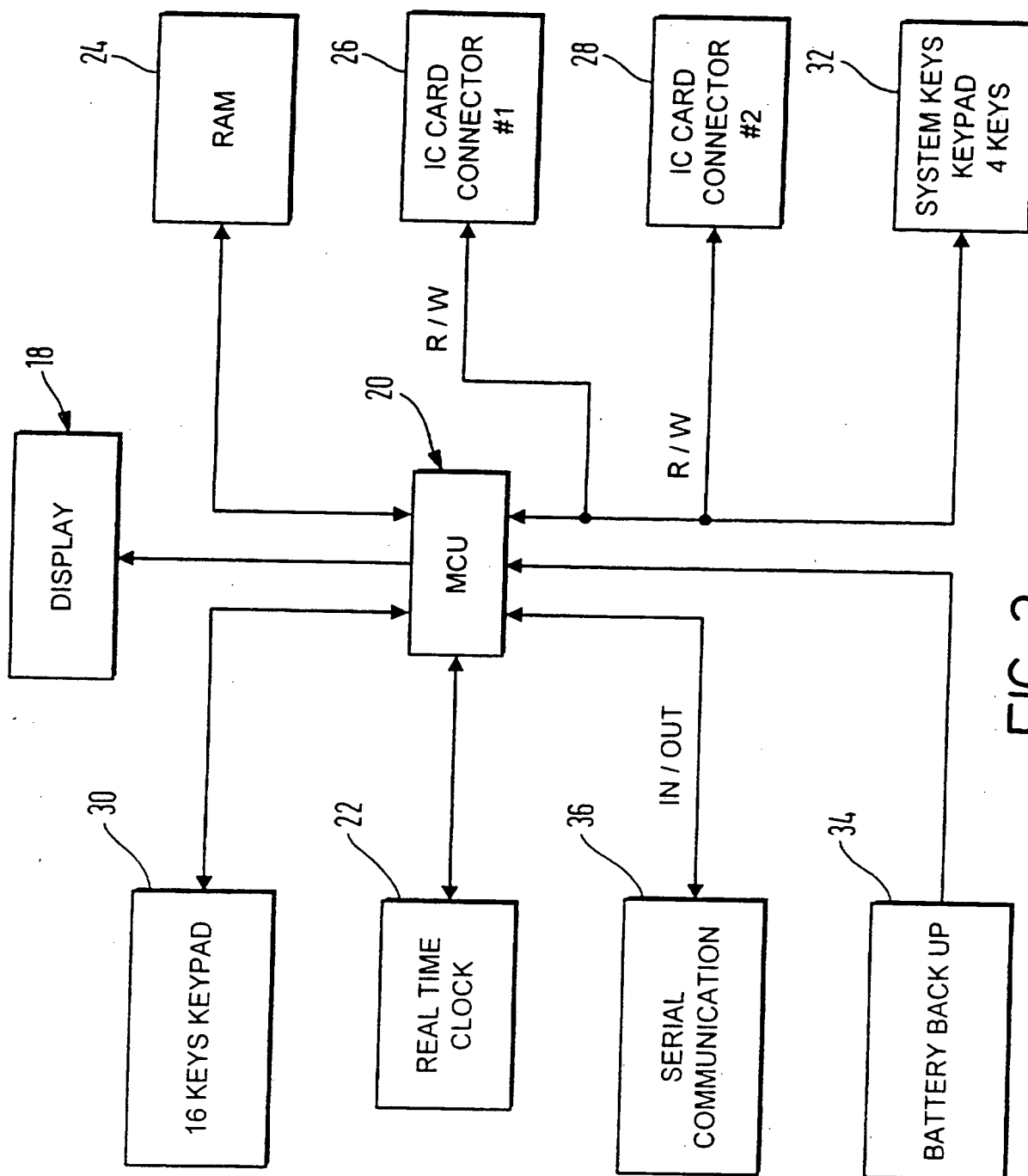
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FIG. 2

FIG. 3

OCID: <WO___9630875A1_I_>

FIG. 4

FIG. 5

CHECK CARD
SLOTS — 74

↓

CARD INSERTED — 76

↓

CARD SELECTION
CHECKING — 78

↓

SINGLE CARD ? —80 →NO→ DOUBLE CARD
FUNCTION — 86

YES ↓   ↓

RECORD:
TIME, ID'S, CODES.. — 82   WITHIN NORMAL
ENTRY TIME ? — 88 →NO→

↓   YES ↓

RETURN — 84   RECORD:
AUTHORISATION,
REASON CODE.... — 90

DCID: <WO___9630875A1_I_>

FIG. 6(I)

START

↓

INSERT SECURITY AUTHORIZATION CARD — 100

↓

DETERMINE IF THE SECURITY CARD IS VALID — 102

↓

SECURITY CARD IS OK ? — 104

NO → DISPLAY ERROR MESSAGE AND SET OFF ALARM — 106 → TERMINATE

YES ↓

EMPLOYEE / GUEST INSERTS ACCESS CARD — 108

↓

DETERMINE ACCESS CARD'S AUTORIZATION TYPE — 110

↓

AUTHORIZATION TYPE IS — 112

PREAUTHORIZATION NOT REQUIRED → CHECK IF CURRENT TIME IS WITHIN NORMAL ENTRY PERIOD ? — 114

PREAUTHORIZATION REQUIRED → CHECK IF ACCESS CODE ON CARD IS VALID — 124

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FIG. 6(II)

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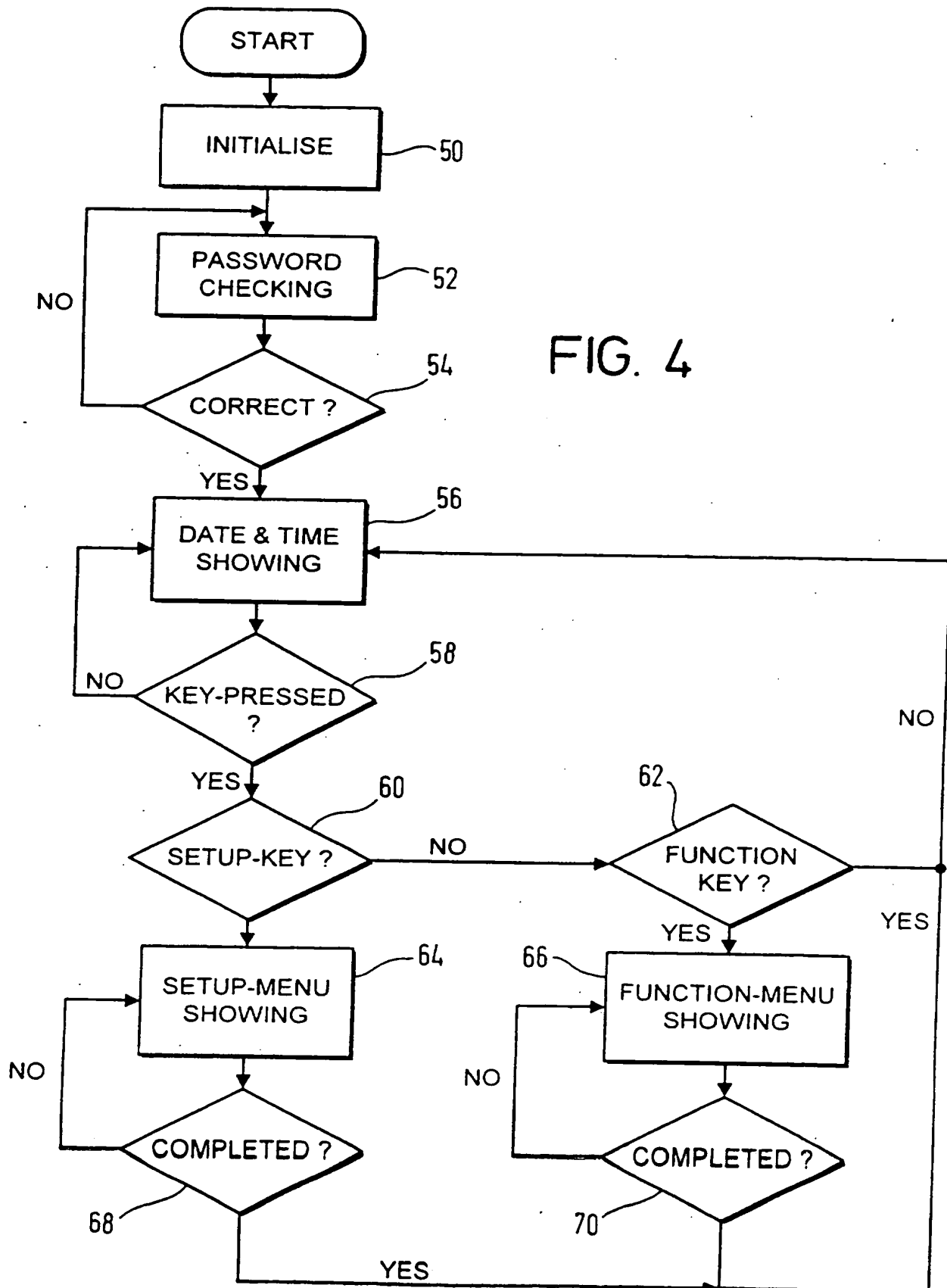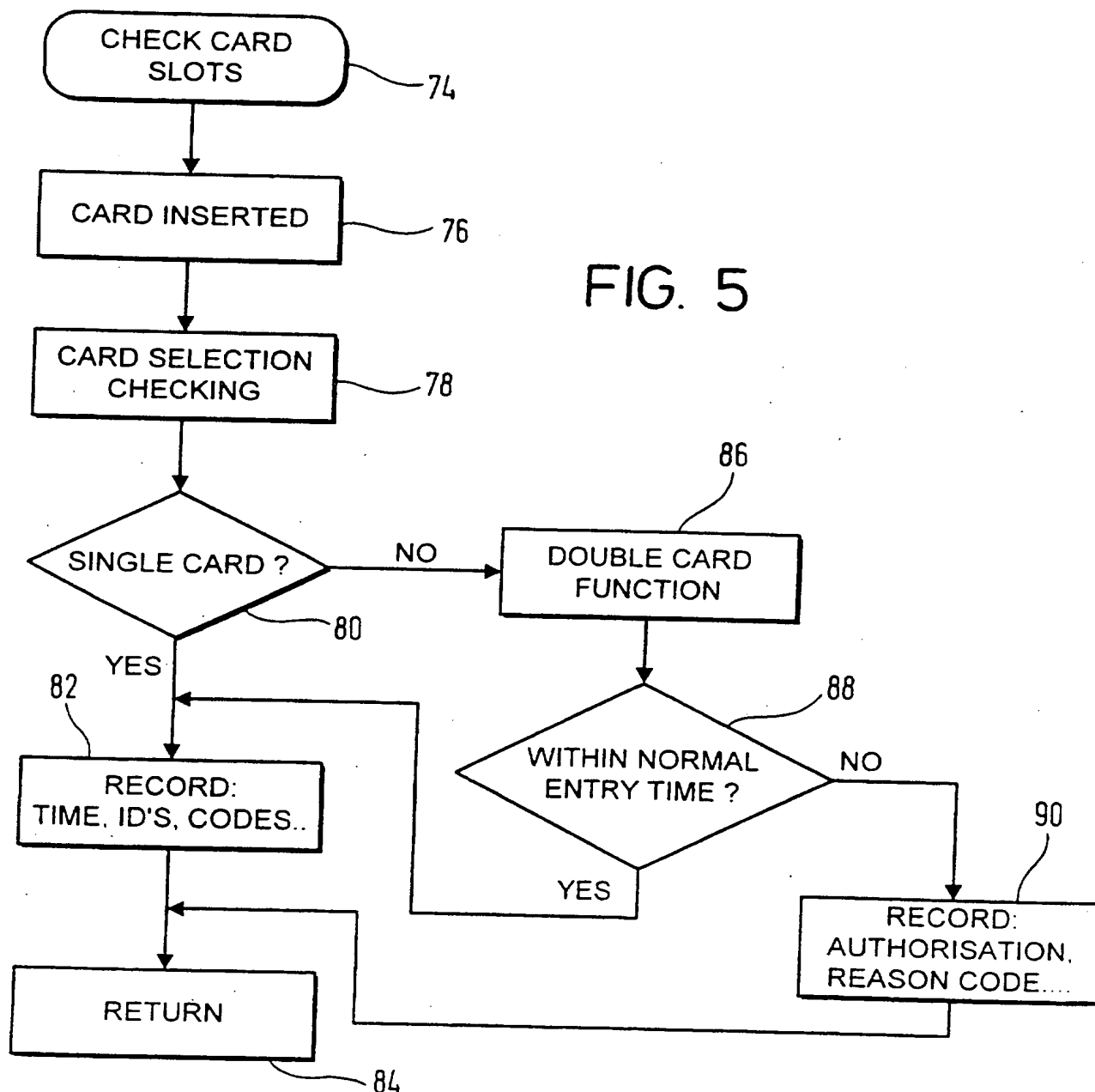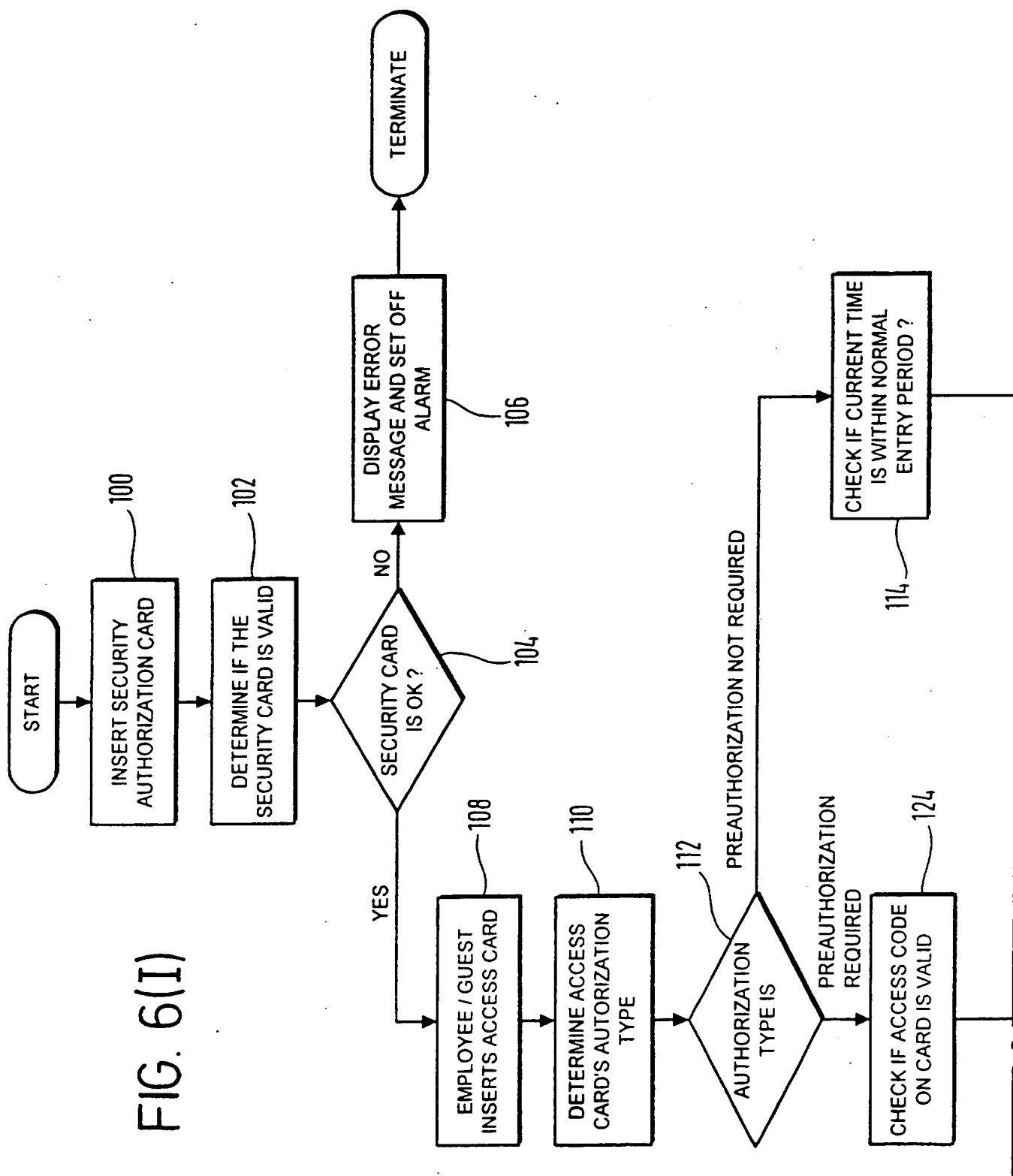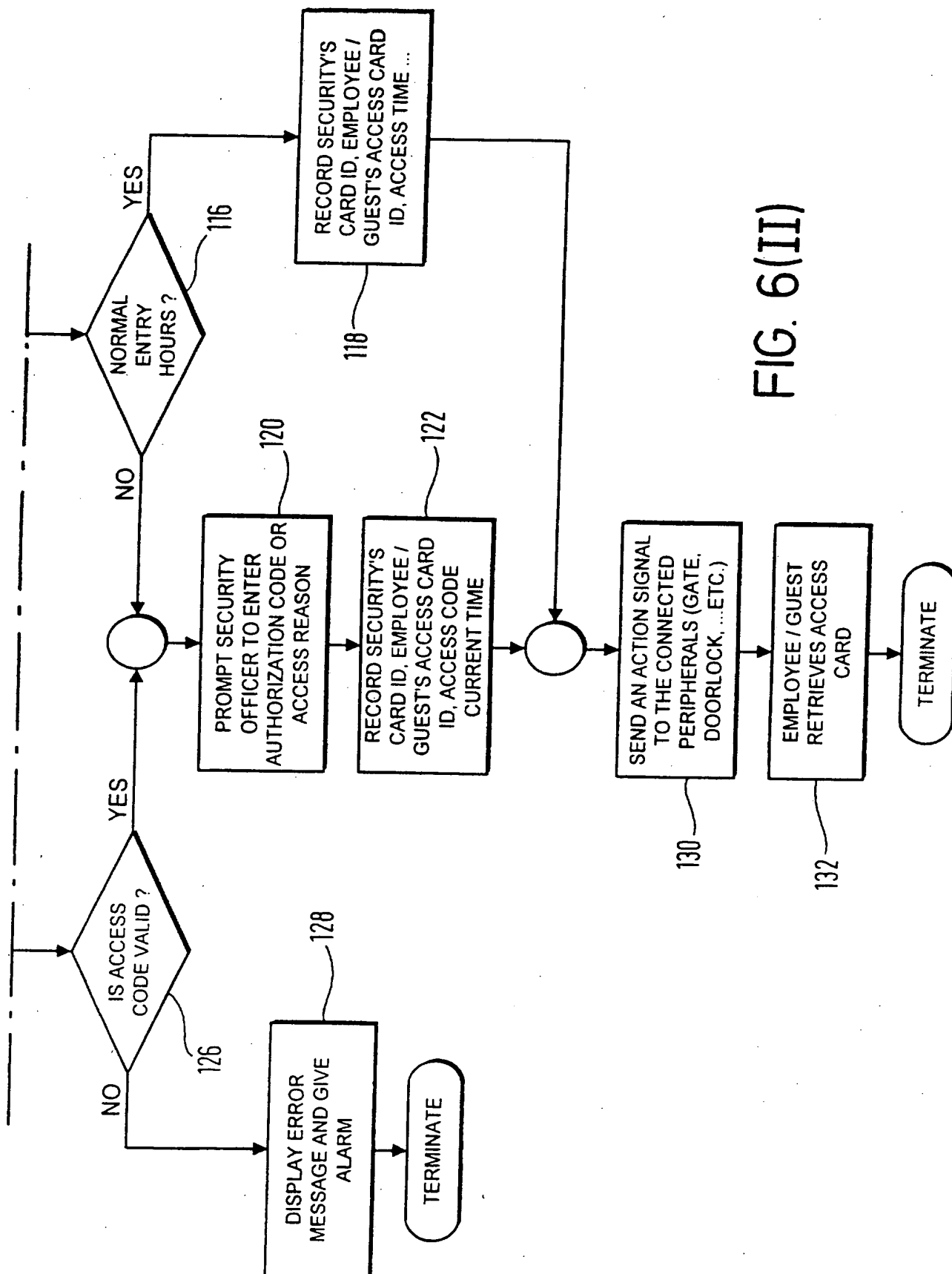
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6   G07C1/10   G07C9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6   G07C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 564 064 (BIANCO JAMES SALVATORE) 6 October 1993 see abstract; claims; figures see column 3, line 39 - column 7, line 34	1-4,7,9, 12,16, 18, 21-23,25
Y A		5,6,15 14,15,17
X	FR,A,2 693 816 (SHIMIZU CONSTRUCTION CO LTD) 21 January 1994 see abstract; claims; figures see page 9, line 10 - page 12, line 26	1,2,4, 12, 14-16, 18,23,25
A		5-7

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[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

Date of the actual completion of the international search	Date of mailing of the international search report
11 July 1996	26. 07. 96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 . NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Meyl; D

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR,A,2 635 895 (UNIDEL SECURITE) 2 March 1990 see page 8, line 5 - page 11, line 21 see page 14, line 1 - page 20, line 22; figures	7,9-11, 13,14, 16-18, 21,22, 24,26
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